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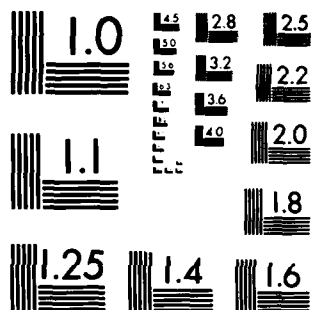
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SIO REFERENCE SERIES

SIO SEA BEAM USERS PRIMER

By:
S. M. Smith

JUL 1 1983

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Reference 83-8

10 June 1983

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GDC Sea Beam Series Nos. 2 & 3

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SIO SEA BEAM USERS PRIMER

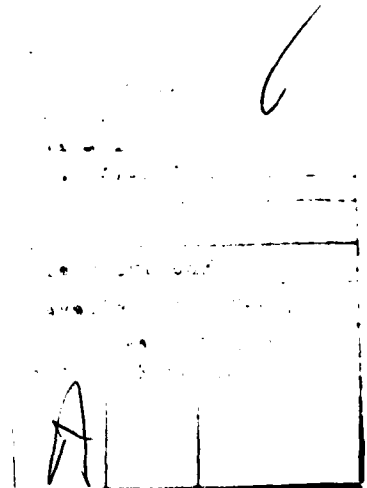
By S. M. Smith

Containing:

Primer for Sea Going Users of the SIO Sea Beam System
(GDC Sea Beam Series No. 3)

and

Primer for Users of the SIO Sea Beam Processing Facility
(GDC Sea Beam Series No. 2)



SIO Reference 83-8

10 June 1983

Scripps Institution of Oceanography

PREFACE

The two user primers, combined here for publication as SIO Reference 83-8, are also designated separately as No. 2 and No. 3 in a Sea Beam Series of documents produced by the Geological Data Center primarily for use within the institution.

The "Primer for Sea Going Users of the SIO Sea Beam System" (Sea Beam Series No. 3) is intended for the scientist planning a program and for others who want general information about the Sea Beam and SIO personnel duties, enhancements, and procedures.

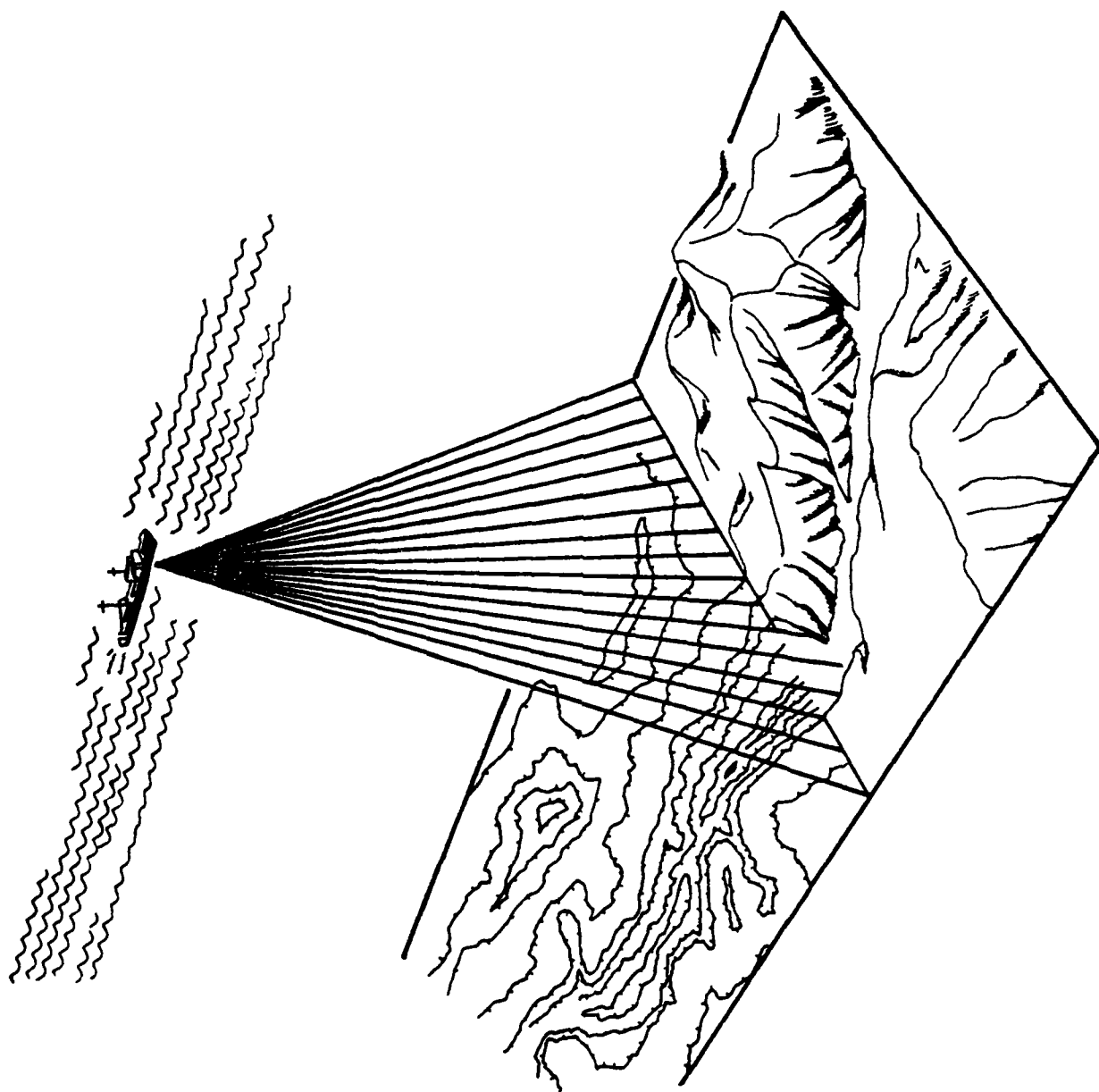
The "Primer for Users of the SIO Sea Beam Processing Facility" (Sea Beam Series No. 2) provides a brief overview of the present shore processing facility and the procedures and regulations for its use.

During the next few years, we fully intend for the documentation efforts to keep up with the anticipated changes and improvements in hardware, software, and operational procedures associated with Sea Beam. These documentation changes, however, will occur in the form of updates and modifications to the local Sea Beam Series rather than as new publications in the SIO Reference Series. Therefore, the reader who needs to know the details of the present state of the system is advised to check with the Geological Data Center for the current documentation.

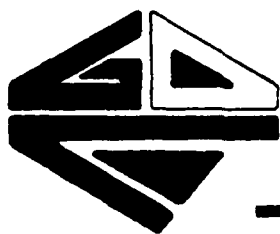
With the exception of the real time contour swath produced by the Sea Beam system as provided by the manufacturer, General Instruments Corporation, all of the system design and programming for merging with navigation and for the DR and post processing plots mentioned in the primers were done by James Charters and J. Lynn Abbott of the SIO Marine Technology Group. Robert Lawhead modified parts of the plot package and wrote enhancements for use on the shore processing facility DEC LSI-11/23 computer.

Funding for production of the primers was provided by the Sea Beam daily rate recharges.

SIO Reference 83-8



SCRIPPS SEA BEAM SYSTEM

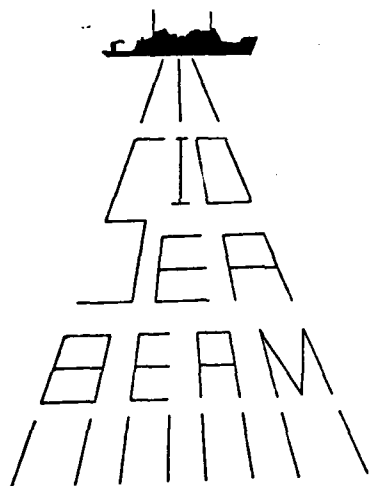


S.I.O. GEOLOGICAL DATA CENTER

SEA BEAM SERIES - NO. 3

PRIMER FOR SEA GOING USERS
OF THE SIO SEA BEAM SYSTEM

By S. M. Smith



10 June 1983

PRIMER FOR SEA GOING USERS OF THE SIO SEA BEAM SYSTEM

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as Natural Scale and as Inches per Degree
of Longitude

PRIMER FOR SEA GOING USERS OF THE SIO SEA BEAM SYSTEM

S. M. Smith
1 June 1983

INTRODUCTION

This document is intended to provide general information for the chief scientist planning to use the Sea Beam system installed on the R/V Thomas Washington operated by the Scripps Institution of Oceanography. The Sea Beam (SB) system is briefly described and the functions of the support personnel outlined, as well as procedures and data products produced on board and by post processing on shore. The processing procedures are still evolving so it behooves the reader to check with the appropriate individuals listed below about the current status.

In January 1984 the Washington will sail with a VAX 730 shipboard computer that will replace the IBM 1800 that has been used for the past 15 years. There will no doubt be some start up problems because all of the real time logging system and many other programs must be re-written or modified for the new machine. We anticipate that the new system will be at least as productive and certainly easier to use than the present one.

ADMINISTRATIVE ORGANIZATION

Sea Beam and other underway geophysical data collection operations are supported by the Marine Technology Group (MTG), one part of the Ship Operations and Marine Tech. Support (SOMTS) Division. Within MTG the Shipboard Computer Group (SCG) provides programming and hardware maintenance, while the Geological Data Center (GDC) performs the processing and data archiving. The Geological Data Center Steering Committee, composed of SIO staff members, provides user input and general guidance.

Contacts:

SOMTS (funding, ship schedules, etc.)	George G. Shor (619) 452-2853
MTG/SCG (programming and hardware)	J. Lynn Abbott (619) 452-4194
GDC (data processing and archiving)	Stuart M. Smith (619) 452-2752

GENERAL DESCRIPTION OF SEA BEAM

Sea Beam, manufactured by the General Instruments Corporation, is a multibeam echosounding system with 16 beams of 2 and 2/3 degrees each, forming an overall cross track angle of 42 degrees for bottom coverage of 80 percent of the ocean depth. Depth beneath the ship and a CRT cross track profile are displayed in real time for each ping cycle (the repetition rate is determined by ocean depth; only one ping in the water

column at one time). A contour swath along ship's track is produced in near real time and the 16 pairs of depth and cross track distances for each ping cycle are transmitted to the shipboard computer. The values are displayed in near real time as contours on a flat bed DR plotter in Mercator projection and saved for later merging with smoothed navigation for post-processed plots. Each of these items or functions is described in more detail in the following sections.

System as provided by General Instruments Corp:

- * Cross track CRT profile.
- * Numeric display of vertical beam depth.
- * UGR monitor analogue output on graphic recorder of vertical beam, selection of all beams, or port or starboard beams only.
- * Digital data output - 16 pairs of depth (meters at assumed velocity of 1500m/sec) and cross track distances.
- * Near real time contour swath along ship's track (referred to as SB Swath Book). Swath scale is in units of meters of sea floor per centimeter on the chart (M/CM) and can range from 50 to 500 M/CM. In practice, chart scales of 100 to 200 M/CM are used. Contour interval can be set as low as 2 meters but the system resolution limits the contour interval to 10 meters. Also if the contour interval is too small, contouring can not keep pace with data acquisition and blank areas appear on the swath plot (see Figure 1).

SIO Enhancements and Procedures:

Near real time:

- * A second swath plotter has been added to provide both an "archive" plot and an identical "survey" plot for use by the scientists.
- * Near-real time DR plot with Sea Beam contours (and optional magnetic anomaly profile) on flatbed plotter. One color (black) with choice of contour, ticking, and dark line intervals (see Figure 2).
- * SB Raw Log tape. Ship time, heading, and 16 pairs of depth and cross track distances are logged onto 9 track tape for each ping cycle.

Post Processing:

- * Navigation: Fixes and courses and speeds are retrieved from the log file on disk at the end of each GMT day. These are input to a navigation smoothing program and the resulting listing examined for consistent drift vectors between adjacent fix pairs. Normally several runs are required to selectively (and subjectively) remove poorer quality fixes until the navigation is judged adequately smoothed.

- * Sea Beam Data Logging: Digital data from the Sea Beam computer (a Data General Eclipse) are transferred to the IBM 1800 for each ping cycle. This data includes time (as known by the Eclipse), ship heading, and 16 pairs of depth and cross track distance. The IBM adds its time/date reference (the one used for merging with the navigation) and the DR position, course and speed before the record is written onto tape.
- * Sea Beam Merging: When a SB raw log tape is filled, typically every 3 or 4 days, that tape and the smoothed navigation file are input to the merging program to produce a SB merge tape (merging requires about 1/2 hour of computer time on the IBM 1800 for each ship day of data).
- * Post processed Sea Beam contour charts: These plots are generated on a four color 36" wide drum plotter. Contour plots with Mercator projection grids and ship's tracks can be made at any reasonable scale (usually between 16 and 120 inches per degree of longitude). Contour interval and interval of contours ticked, drawn double, and color change can be specified as can contour labeling at the edge of the swath. Sections of track can be included or excluded by specifying begin/end ship times. See Appendix I for conversion of chart scale expressed as inches per degree longitude and natural scale. Figure 3 is a one color reproduction of a post processed plot.

The position of the track segments can be shifted on the plot. These shifts apply to that plot only - the input data remain unchanged. Beams may also be deleted for specified time intervals to avoid overlap on the inside of turns or between adjacent tracks.

SEA BEAM RELIABILITY AND PERFORMANCE

Our experience, after the first 15 months of operations in the Eastern Pacific at depths up to 6000 meters, shows the Sea Beam hardware to be very reliable, with only a few percent of down time. Other than the expected loss of outer beams, the Sea Beam performs up to the design specifications of 20 degrees of ship roll and 10 degrees of pitch. Its performance in heavy seas exceeds that of most watch standers and the occasional loss of auto tracking can usually be corrected immediately.

UNITS OF MEASUREMENT, BOTTOM COVERAGE, AND RESOLUTION

A sound velocity profile is input to the SB operating program for the ray bending calculations and to calculate true cross-track distances. The depth, however, is contoured and the digital depth data logged in units of meters with an assumed sound velocity of 1500m/sec.

Cross-track coverage is about 80 percent of the ocean depth. The minimum depth that Sea Beam can track is 34 meters in the standard deep sea configuration. Figure 4 shows the cross-track distance, expressed in meters and nautical miles, covered at each ocean depth. Also shown in Figure 4 is the variation of swath width with depth at various plot scales.

Although contour intervals as small as 2 meters may be plotted, depth resolution appears to be limited to 10 meters in normal ocean depths.

The horizontal resolution is dependent on depth. The table below gives the area insonified by one of the 16 formed beams, each having dimensions of $2\frac{2}{3}$ by $2\frac{2}{3}$ degrees. The ping cycle repetition rate is dependent on ocean depth because Sea Beam allows only one ping in the water at one time. The amount of over sampling along track compared to cross track is a function of ship speed. For a ship traveling 10 knots, the along track sampling is 6.8 times cross track (i.e. nearly 7 ping cycles occur before the ship has moved along track sufficiently to insonify a completely new area of seafloor). It is possible, however, to slow the repetition rate by using a slow sweep on the SB UGR Monitor recorder (see next section).

Ocean Depth (meters)	Horizontal Area of each $2\frac{2}{3}$ degree beam	Minimum Repetition Rate (sec)
1000	47 x 47 meters	1.33
3000	140 x 140 meters	4.0
6000	280 x 280 meters	8.0
10000	466 x 466 meters	13.3

INTERACTIONS WITH OTHER SOUND SOURCES

Although not specifically designed to do so, Sea Beam will operate with 3.5 kHz and seismic profiler sound sources as long as the outgoing pulses and return signals are kept out of the time window in which Sea Beam expects the bottom return. This can be done with some constraints on repetition rates and recorder sweep speeds.

When operated alone, the Sea Beam UGR Monitor recorder is normally run on a 2 second (1500m) sweep. The UGR can be run on a 10 second sweep which provides a good overview profile but with loss of detail. The SB repetition rate is then 10 seconds rather than the usually faster rate that occurs in normal ocean depths. A second (EPC) recorder, if not used for 3.5kHz, can be slaved to the SB UGR and run on an eight second sweep to provide an overview profile.

When the 3.5kHz is run, both the 3.5kHz and SB UGR recorders must be on 2 second or slower sweeps to avoid interference.

The addition of a seismic profiler sound source requires operating both Sea Beam and the seismic source at 10 second rep rates and the 3.5 kHz at 2 seconds. The various outgoing pulses and return signals are kept separated by periodic manual phasing of the 3.5 kHz and SB UGR recorders, a procedure which requires some expertise on the part of the watch stander.

MTG personnel are exploring solutions to these multi-source interference problems so the user is advised to check with them about the present state of the art and current recorder configurations.

SEA BEAM RELATED FUNCTIONS OF SHIPBOARD MTG PERSONNEL

In addition to the Resident Technician and Computer Technician (whose duties are described in the Chief Scientist's Manual), cruises using Sea Beam carry a SB Engineer who maintains the hardware and a SB Operator/Processor. The operator/processor initializes and updates parameters required by the SB operating program, instructs the watch standers and scientists in use of Sea Beam, archives the SB related data, smooths the navigation, and produces the SB merged files. When these primary tasks are completed, the SB Operator is available to run post processed plots or to assist the chief scientist as requested.

It is MTG policy that no overtime above the standard 56 hours per week while at sea will be approved without prior agreement with the chief scientist who will be charged for the overtime. MTG personnel will, of course, be willing to help in critical situations or emergencies. The Chief Scientist should not, however, pre-schedule a work load greater than the standard work week.

Normally MTG technicians do not stand underway watches so there should be a minimum of 3 additional people available in the scientific party to keep the normal 4 hours on, 8 hours off, watch schedule. Sea Beam requires no talents beyond those usually expected of a watch stander. In fact, once trained, Sea Beam watch standing is easier than the old days of single beam echosounding programs, lost bottoms, and wrong depth intervals.

NOTES AND COMMENTS RELATING TO PLOTS

Swath (real time) contour plots:

About one 1" thick "book" of fan folded 11" wide plot is generated on each of the two plotters per day at a scale of 150M/CM, or 20 books per 25 day cruise. The archive plot is turned over to the SB operator for return to the Geological Data Center. The survey plot may be used by the chief scientist as desired. In the event of one plotter malfunctioning, the archive plot has priority.

The SB swath plot and the CRT cross track display have proved very helpful during dredging and other bottom or near bottom sampling operations. The G.I. Corp. supplied contour package is such that a minimum physical distance on the plotter must be covered, dependent on ship speed and plot scale, before the contours are updated. Therefore, when stopped on station, it is necessary to switch the SB from auto speed log input to a fraudulent manual speed (usually 4 to 6 knots). This allows update at 30 second to one minute intervals but does result in the loss of true scale in the direction of ship travel.

There is a problem with the infrequent updating of contours during slow speed (1-2 knot) operations such as Deep Tow or Sea Mark which require true scale plotting. The solution to this problem will be explored with the manufacturer.

Near Real Time DR Track and Contour Plot:

The DR plot is done on a rather slow, elderly but reliable one color flatbed plotter (Calcomp Mod. 502). The plotter step size is .01", with less resolution than the .002" size of the Houston Instruments plotter used for the post processed plots. Fixes are plotted, as are crosses for DR positions updated at selected intervals (usually 5 to 30 minutes). SB contours are updated every few minutes and plotted relative to the DR positions. When a new fix is received, the smoothed track line is drawn from the previous fix to the new point along with an optional magnetic anomaly profile.

Within reasonable limits the chief scientist may choose the scale and contour interval appropriate to the topography and problem being studied. For transits, contour intervals of 20 to 50 meters and plot scales between 16 and 32 inches per degree usually suffice. For surveys we have observed that it is better to sacrifice the detail obtained on several larger plots for the convenience of having the whole survey on a single plot at a smaller scale.

The present IBM 1800 system imposes further constraints and scheduling problems - namely no merging or post processed plots may be going on when the DR plot is changed and the grid redrawn. Also, a small contour interval on the DR plot significantly slows down the other background computer operations.

At present, lack of plotter resolution precludes contour labeling on the DR plot. Most scientists have found it helpful to have the U/W watch use colored pencils to show depth intervals (an exercise that gives the watch stander a better appreciation of topography and promotes alertness).

Post Processed Sea Beam Contour Plots:

Input set up and running of the post processed plot programs will be done by the SB operator. One member of the scientific party should be designated to coordinate plot requests; establish priorities; provide input specifications of plot boundaries, contour intervals, track adjustments, and begin/end times to the SB operator; and to handle the resulting plots. Depending on the project, this can be a time consuming task, requiring several hours or more a day.

It is helpful to establish a scheme of short identifiers for plot titles and general communications; either consecutive numbers or abbreviations such as "T3-4" for transit line 3, plot 4.

For surveys, a plot is first run using the smoothed navigation contained in the SB merged file. If adjustments are necessary, these can be measured from the plot and given to the SB operator for input for the next adjusted plot. Although the SB operator is familiar with the mechanics of plot adjustment, many require a knowledge of the geological problem at hand and therefore should be done by a designated member of the scientific party. Remember that the adjustments apply only to that plot; the navigation in the SB merged file remains unchanged. It is a good idea to keep a copy of the input specifications so that an adjusted plot may be duplicated in the future.

PLOTTING TIMES, PRIORITIES, CO-CHIEF SCIENTISTS, AND REQUIREMENTS IN FOREIGN WATERS

Within the confines of the 56 hour work week the chief scientist may choose to have one plot done for each part of the cruise leg or instead concentrate on multiple adjustments of one survey area. For example, it requires about 15 minutes of operator setup time and 45 minutes on the plotter for one 60"/degree scale plot containing 3 hours of ship track and contours at 20 meter intervals in moderate, East Pacific Rise type relief. The SB operator will, on average, have about 2 to 4 hours a day available for post processed plotting.

For cruise legs with co-chief scientists or multiple programs, agreements should be reached at the beginning of the leg as to who gets the survey copy of the swath books, DR plots, etc. Priorities on plotting time and any splitting up of the leg by time or geographic boundaries should be communicated to the SB operator. The operator should also be informed of any requirements for plots or other data that need to be provided to foreign observers.

DATA PRODUCTS PRODUCED AT SEA

Assuming a GDC person is on board as SB operator/processor, the chief scientist can usually expect to walk off the ship (and is responsible for transporting) the following items:

- 1) Survey copies of Swath Books (= one carton 13"x13"x20", total weight 35lb. for 20 books).
- 2) DR/SB contour real time flatbed plots (= one tube 6"x36").
- 3) Smooth (but not SB adjusted) navigation list (15"x11"x1")
- 4) Small scale navigation index plot.
- 5) Post processed SB contour plots (1 or more rolls 6"x36").

Normally one should not plan on additional plots being done in port because of problems with ship power and computer availability, maintenance requirements, personnel departures, and, of course, R & R.

The following items will be sent back to SIO by the SB operator for archiving and further processing at the Geological Data Center:

- 1) SB Merge tapes (about six 1200' tapes per 25 day leg).
- 2) SB UGR Monitor records (about 6 per leg at 2 second sweep).
- 3) Navigation file on tape.
- 4) Archive copies of the SB Swath Books.
- 5) SB Raw Log tapes (6 per leg). May be returned to SIO or left on board depending on transportation situation.

ON SHORE PROCESSING ACTIVITIES AND FACILITIES

The standard post cruise processing and archival procedures done by GDC staff, that relate to Sea Beam, are:

- 1) Finish any navigation smoothing and SB merging not completed on board.
- 2) Make working copies of the SB merge tapes and archive the originals.
- 3) Microfilm the UGR Monitor records, swath books, and navigation lists and track plots onto 35mm flowfilm microfilm. Archive the original records.
- 4) Generate index track plots.
- 5) Produce archive series of Sea Beam contour charts (scale = 16"/degree; contour interval = 50 m; black and white). When released from any proprietary hold, these will be available for inspection or duplication at GDC.
- 6) Convert SB merge files to the standard SB exchange format and send to the national data center (NGDC) after data are released. (This exchange format is now in the process of being defined.)

If additional funds for underway data processing are provided, the following will also be done:

- 1) Extract vertical beam depths from the SB merge files as well as magnetics and gravity from the PFILE log file. Generate profiles of ship time vs each parameter. Edit out bad points.
- 2) Produce an u/w merge file containing navigation and the above parameters at one minute intervals of ship time.
- 3) Index the merge file into the multi-cruise data base and generate an on-line abstract navigation file.
- 4) Microfilm the 3.5kHz and seismic profiler records. Archive the originals.
- 5) Produce an informal cruise report containing track charts, profiles of depth, magnetics, and gravity plus Sample Index (an interdisciplinary index having time, position, and disposition of all samples, records and measurements collected on the cruise).
- 6) Cruise track added to the GDC summary index track charts.
- 7) Slow sweep seismic reflection profiler records blown back onto Mylar at reduced scale, organized by geographic area.
- 8) Convert the u/w merge file to the standard MGD77 exchange format and send to NGDC when released.
- 9) Duplicate and send microfilm copies of the seismic reflection records to NGDC when released.

NOTE: As of January 1984, costs for producing the cruise report; general indexing and archiving functions; as well as vertical beam depth processing will be included in the daily charge for Sea Beam use. Additional funds to cover costs for processing magnetic, seismic profiler, and gravity data should be provided, however.

Additional copies of any of the above data products may be obtained by the chief scientist for the cost of reproduction.

The GDC also manages the Sea Beam Post Processing Facility which has been set up for plotting SB contour charts. After a short training session, the scientist or members of their staff may use the facility, paying an hourly fee. Alternatively, GDC staff can do the plotting for the additional cost of their hourly recharge rates. Principal investigators should include anticipated post cruise plotting costs in their proposals, in addition to the daily Sea Beam rate. Refer to the list of associated documentation for more information about the post processing facility.

PROPRIETARY HOLDS ON THE DATA

As with other u/w data collected on SIO ships, Sea Beam data are normally retained on "Institution Hold" for the exclusive use of the chief scientist, SIO students and staff for a period of two years following a cruise leg. A chief scientist (or person responsible for the data being collected) may place an additional "Proprietary Hold" to further limit access to those he or she so authorizes. After release, which requires explicit clearance from the chief scientist, the data are sent to the national data center in Boulder, Colorado, which satisfies funding agency requirements for archiving of data collected on federally funded projects. Retention of data for a significant length of time beyond the nominal two year period requires approval from the Geological Data Center Steering Committee.

A SUGGESTED LIST OF PLOTTING AND DRAFTING SUPPLIES

The Resident Technician maintains an inventory of standard office supplies - note pads, pens, pencils, pencil sharpener, masking tape, etc. for use, in moderation, by the scientific party. Over the years we have also tried, usually unsuccessfully, to keep drafting/plotting tools and supplies available. Check with the Res Tech about the present status, but these are some of the supplies you might consider bringing:

Drafting pens and pencils	Rolls of acetate, Mylar or velum
Parallel ruler	Colored pencils (lots)
Triangles	Bean bags
Steel Straight edge	Scissors
10-spacers or Gerber scale	Electric pencil sharpener(?)
Protractor	Engineering rulers

A LIST OF SEA BEAM RELATED DOCUMENTATION AND INFORMATION

Contact the group whose initials appears in parentheses for each of the documents.

Chief Scientist's Manual (SOMTS)

Scientist's Hand Book: R/V Thomas Washington (SOMTS)

Rates for Various Technical Services (SOMTS or MTG)

Sea Beam Series No. 1: Sea Beam Operator's Manual (GDC)

Sea Beam Series No. 2: Primer for Users of the SIO Sea Beam Processing Facility (GDC)

(ship heading) 14/39/44 (time HH/MM/SS)
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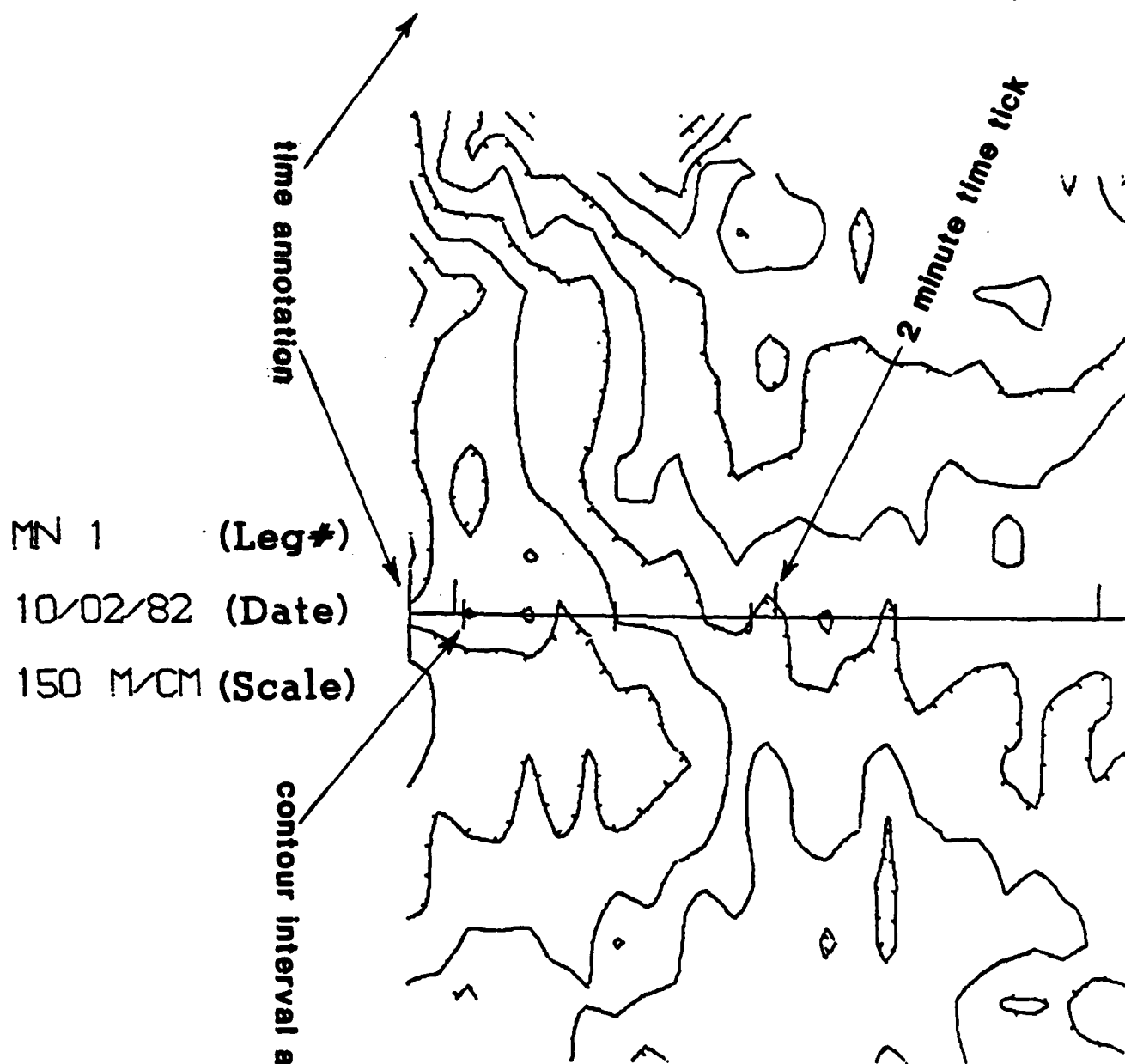


Figure 1: Annotated Example of SB Swath Book

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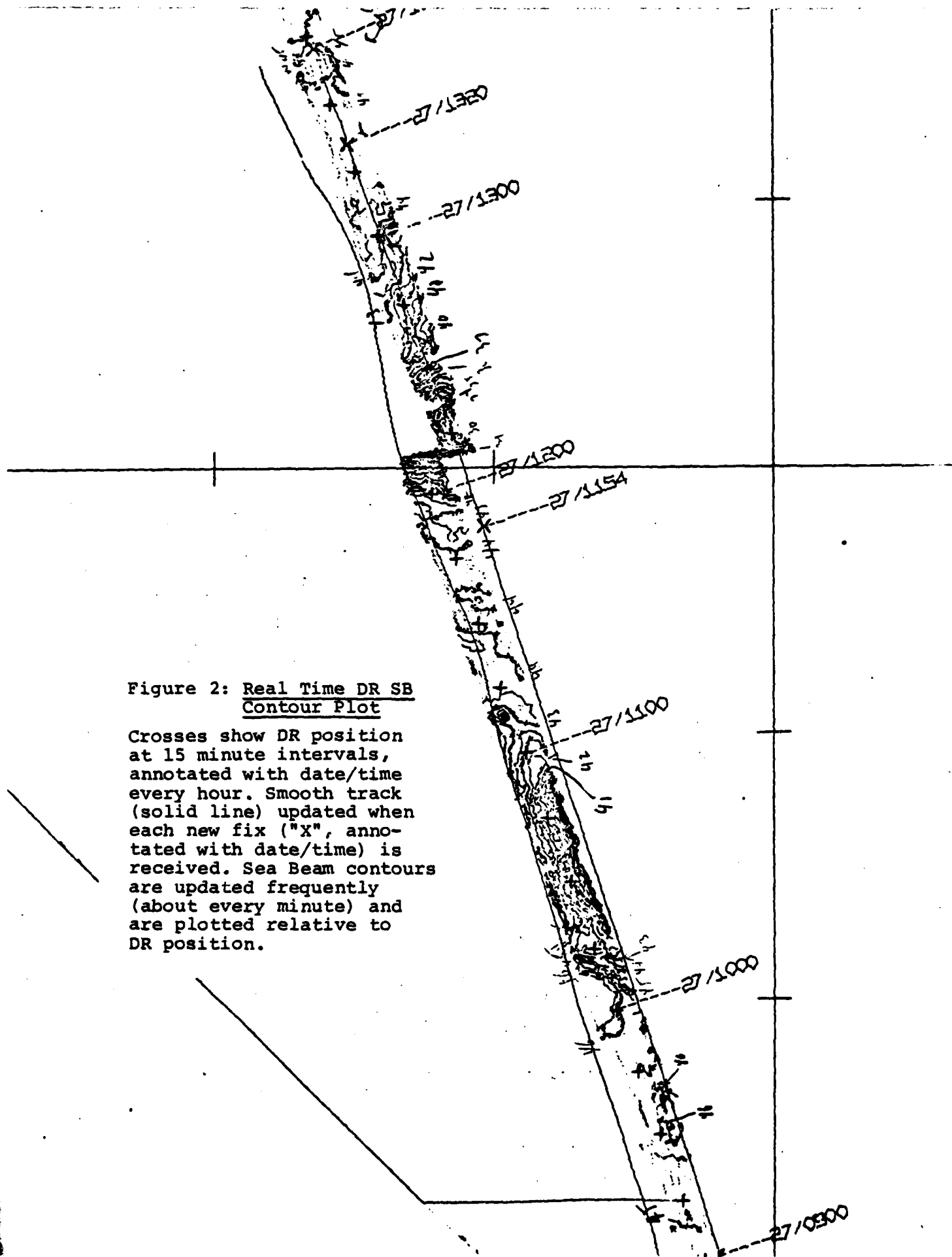


Figure 2: Real Time DR SB
Contour Plot

Crosses show DR position at 15 minute intervals, annotated with date/time every hour. Smooth track (solid line) updated when each new fix ("X", annotated with date/time) is received. Sea Beam contours are updated frequently (about every minute) and are plotted relative to DR position.

P.I.Primer Fig. 2 PASC04WT 20/A11 B1k/(CSPRIM.001)

Mercator Projection, Scale= 30.00 in/deg longitude

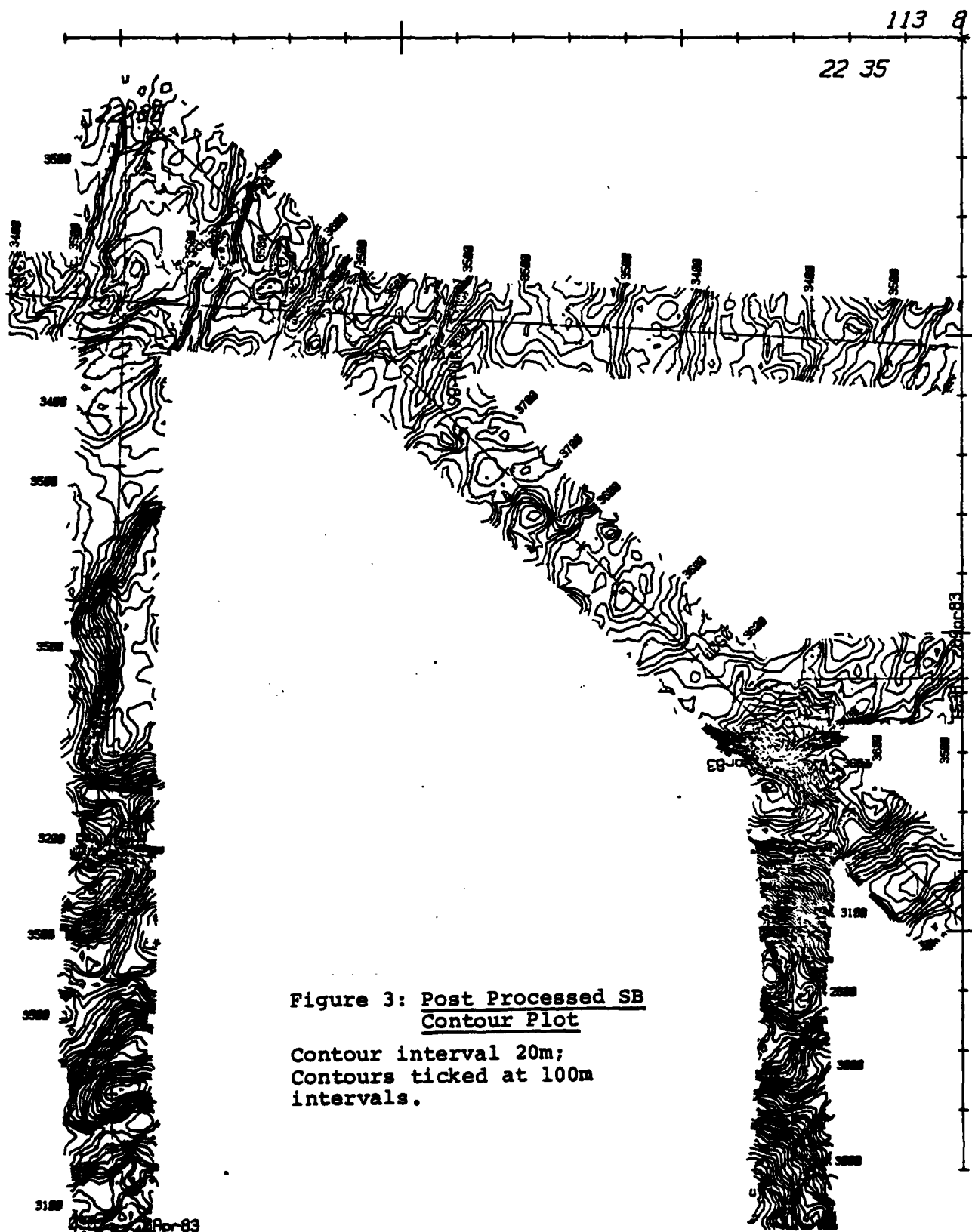
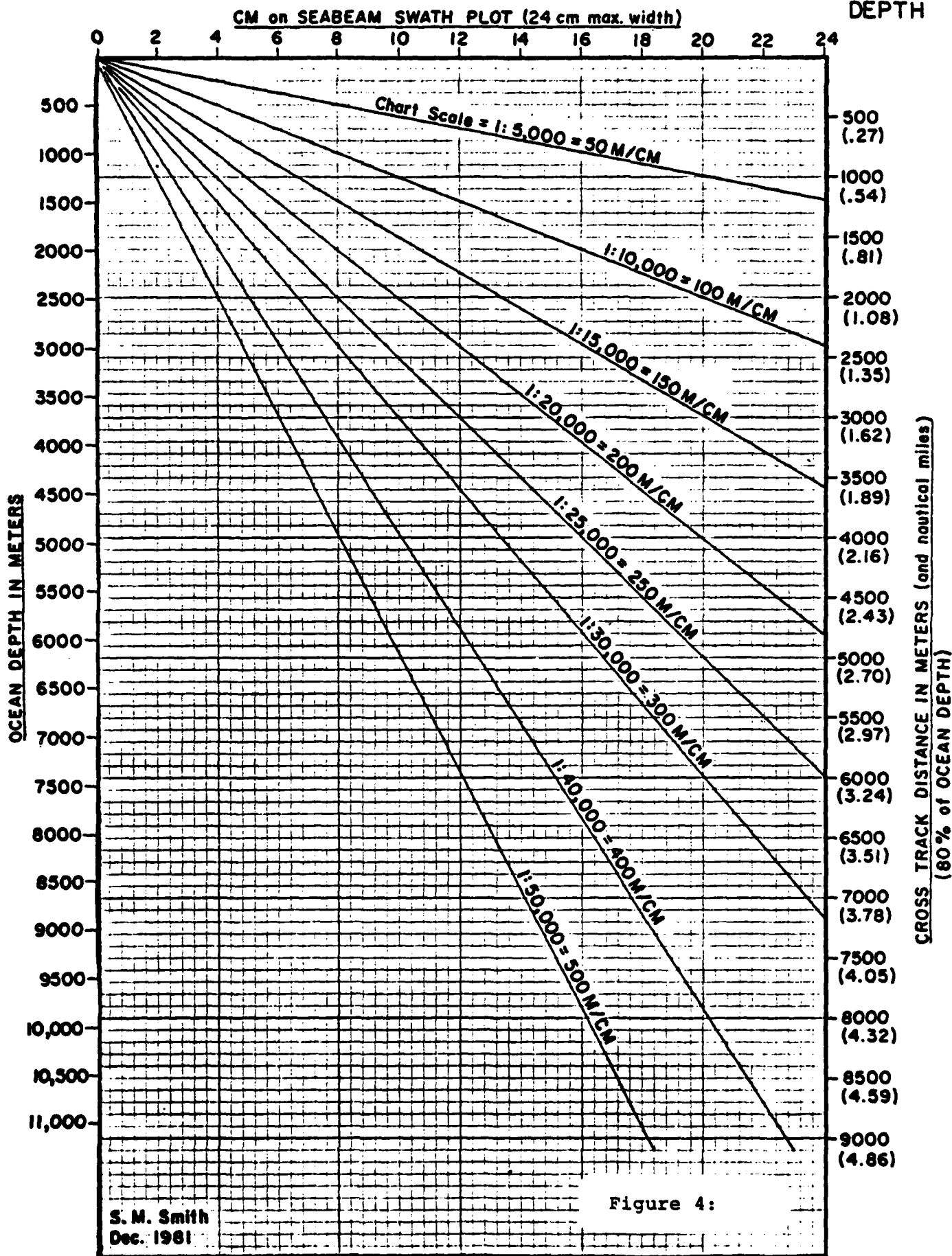


Figure 3: Post Processed SB
Contour Plot

Contour interval 20m;
Contours ticked at 100m
intervals.

SEABEAM - RELATIONSHIPS BETWEEN CHART SCALE, SWATH WIDTH & OCEAN DEPTH



APPENDIX I

Relationship between Mercator Projection Chart Scales Expressed as Natural Scale and as Inches per Degree Longitude

It is often more convenient to express the scale of a Mercator projection chart as "inches per degree of longitude" rather than as a natural scale, which is latitude dependent (e.g. 1:50,000 at latitude 33 degrees).

METHOD: Assume a spherical earth with an equatorial radius of 6378.144 km (from the WGS-66 model, as used in the navigation satellite computations)

Therefore, inches per degree of longitude at the equator =

$$6378.114 \text{ km} \times 2 \times 3.14159 / 360 \text{ degrees} =$$

$$1.113196 \times 10^{(7\text{th power})} \text{ cm} / 2.54 =$$

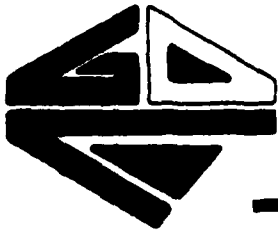
$$4.38266 \times 10^{(6\text{th power})} \text{ inches per degree longitude.}$$

If NS = natural scale = $1/n$ (e.g. NS = 50,000 for scale of 1:50,000) and IPD = inches per degree of longitude, then

$$\text{IPD} = 4.38266 \times 10^{(6\text{th power})} \times \cos(\text{latitude}) / \text{NS}$$

Examples of Mercator Chart Scales Expressed as Natural Scale, Sea Beam Units of M/CM, and Inches per Degree Longitude

Natural Scale at equator	Sea Beam (M/CM)	Inches per Degree of longitude
5,000	50	876.532
10,000	100	438.266
15,000	150	292.177
20,000	200	219.133
25,000	250	175.306
30,000	300	146.089
40,000	400	109.567
50,000	500	87.658
68,479	-	64.0
73,044	-	60.0
136,958	-	32.0
146,089	-	30.0
182,611	-	24.0
273,916	-	16.0
547,833	-	8.0
1,095,666	-	4.0

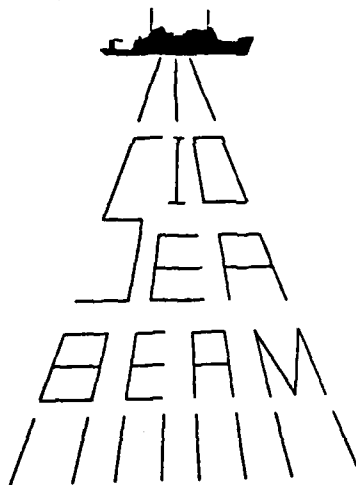


S.I.O. GEOLOGICAL DATA CENTER

SEA BEAM SERIES - NO. 2

PRIMER FOR USERS OF THE SIO
SEA BEAM PROCESSING FACILITY

By S. M. Smith



5 January 1983

PRIMER FOR USERS OF THE SIO SEA BEAM PROCESSING FACILITY

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PRIMER FOR USERS OF THE SIO SEA BEAM PROCESSING FACILITY

Written by: Stuart M. Smith, SIO/GDC
5 January 1983

GENERAL INFORMATION

The SIO Sea Beam Processing Facility has been set up for the post cruise processing of Sea Beam (SB) data by members of the scientific community and by Geological Data Center (GDC) staff. The facility is administered by GDC, a part of the Marine Technology Group. General guidance, establishing policies, and setting priorities for the facility and other GDC functions are done by the GDC steering Committee. Hardware and software support are provided by the Shipboard Computer Group.

The main function of the single user, hands-on facility is that of producing contour plots from SB data previously merged with navigation on the IBM 1800 computer. SB merged data are transferred via tape onto disk and then manipulated by various programs that reference an "input parameter file". SB contour plots with grids and ship tracks, on Mercator projection, can be generated at any reasonable scale (usually between 16" and 120" per degree longitude). Contour interval and interval of contours ticked, drawn double (dark) and change of color are selectable, as is contour labeling at the side of the contour swath. Sections of track can be included or excluded by specifying begin/end ship times. The position of track segments can be shifted on the plot (these shifts apply to that plot only - the input data remain unchanged). Beams may also be deleted for given time intervals to avoid overlap on the inside of turns.

LOCATIONS/PHONE NUMBERS

Machine Room: 1247 Ritter Hall/SIO
Facility Phone: Ext. 3498 (not heard in GDC offices)

GDC Offices: 1314 & 1317 Ritter Hall
GDC Phone: (619) 452-2752

Shipboard Computer Group: 0267 Ritter Hall
SCG Phone: (619) 452-4194

EQUIPMENT

DEC LSI PDP11/23 Computer
RT-11 Operating System
Four color 36" Drum Plotter (Houston Inst. Mod. CPS-15/6)
Winchester/floppy disk unit (30 Mbyte- DSD Corp. Mod. 880)
Magnetic tape drive, 1600/3200bpi (Cipher Mod. F880)
CRT Console Terminal (ITOH Mod. CIT-101)
Hard copy printer (Decwriter IV)

WHO MAY USE THE FACILITY

Any SIO student or staff member, as well as scientists from other institutions (or their representatives) who have had Sea Beam programs

on the Washington, are eligible to use the facility. However, only those who have received training on use of the equipment and procedures will be authorized as users. Keys to the facility will be signed out to certified users for the time required to complete their projects.

USER CERTIFICATION/TRAINING

Short courses on use of the equipment and procedures will be offered at appropriate intervals by the GDC staff. Users who require individual training on short notice will be asked to pay for the necessary GDC staff time.

DATA AVAILABILITY, PROPRIETARY HOLDS, AND CHECK OUT PROCEDURES

As with other underway geophysical data collected on Scripps ships, Sea Beam data are normally retained on "institution hold" for the exclusive use of the chief scientist, SIO students, and staff for a period of two years following the end of a cruise leg. A chief scientist (or person responsible for having the data collected) may place an additional "proprietary hold" to further limit access to those he or she so authorizes.

Users will normally use working copies of the SB merged tapes (data from the SB raw log tapes merged with navigation) which will be provided by the GDC staff as part of the standard SB processing procedure. These tapes will be stored in the machine room unless the person responsible for a proprietary hold on the data chooses to keep the tapes in his or her custody. In that case, that individual will be responsible for keeping track of who has the tapes, access authorization, and replacement costs if the tapes are lost or damaged. Working copies may be checked out for use at other on-campus facilities for up to a day or two but if needed for a longer time, arrange for having a duplicate made.

USER SIGN-UP RULES

- 1) The facility is available for user sign-up at all times. However, first priority between 0800-1000 hours Monday through Friday will be given to system maintenance and standard processing by MTG staff.
- 2) "Prime hours" are defined as being between 0800-1800 hours Monday through Friday, with "non-prime hours" being the remainder.
- 3) A sign-up board is located outside the machine room. Time can normally be signed up for in 2 hour blocks up to 2 weeks in advance. Only one 2-hour block may be signed up for by an individual or group working on any one project during prime time on any one day. One 4-hour block in non-prime time may also be signed up for on that day. If on the morning in question, time is still available then additional time may be signed up for.
- 4) Cancellation of sign up time must be made by 1300 hours of the last working day (Monday-Friday) prior to the time being

cancelled. Failure to do so will result in the user being charged for the reserved time at one half the current rate. Users who fail to show up within 15 minutes of their scheduled starting time may find their time assigned to someone else.

- 5) If required by the work load, the following priority system will be invoked (from high to low):
 - 1 - System hardware/software maintenance.
 - 2 - Prep. for impending cruise.
 - 3 - Process/plot SB data from recent SIO cruises less than 4 months old.
 - 4 - Process/plot SB data from older SIO cruises.
 - 5 - Process/plot non-SIO SB data.
 - 6 - Process/plot other u/w geophysical data from SIO cruises.
 - 7 - Other uses.
- 6) Changes of dates or erasures of users names on the sign-up board are to be done only by GDC staff.
- 7) Provisions can be made for scientists from other institutions who have had SB projects on Washington to come to Scripps and use the facility intensively for a few days during non-prime hours on evenings and weekends. Arrangements should be made at least 3 weeks in advance and may be limited by work load constraints.

COSTS

Users will be charged an hourly rate for use of the facility to cover system maintenance and reasonable use of expendable supplies. (Users are urged to keep costs down by conserving plot paper. As of November 1982 a 120' roll on which one can get only 10 plots if care is not taken, costs \$28).

As of November 1982 the facility will be charged at \$10/ hour. This rate will be adjusted as required.

DOCUMENTATION

Other Sea Beam Documentation of interest to the facility user are:

Overview of Sea Beam Documentation

Reference Guide for Users of the SIO Sea Beam Processing and Plotting Programs on the LS111/23

Hardware Notes for Users of the SIO Sea Beam Processing Facility

These documents may be obtained from GDC staff.
(to be available by the end of January 1983)

DATE
ILME